



Lei Li, Zhigang Li, Hossain Shahriar, Rebecca Rutherford,  
Svetlana Peltsverger, and Dawn Tatum

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# Ethical Hacking for Effective Defense

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## Grants Collection

Affordable Learning Georgia Grants Collections are intended to provide faculty with the frameworks to quickly implement or revise the same materials as a Textbook Transformation Grants team, along with the aims and lessons learned from project teams during the implementation process.

Each collection contains the following materials:

- Linked Syllabus
  - The syllabus should provide the framework for both direct implementation of the grant team's selected and created materials and the adaptation/transformation of these materials.
- Initial Proposal
  - The initial proposal describes the grant project's aims in detail.
- Final Report
  - The final report describes the outcomes of the project and any lessons learned.



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# Initial Proposal

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## Application Details

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### Manage Application: ALG Textbook Transformation Grants Round 8

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**Award Cycle:** Round 8

**Internal Submission Deadline:** Sunday, December 11, 2016

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**Application Title:** 302

**Application ID:** #001299

**Submitter First Name:** Lei

**Submitter Last Name:** Li

**Submitter Title:** Associate Professor

**Submitter Email Address:** lli13@kennesaw.edu

**Submitter Phone Number:** 470-578-3915

**Submitter Campus Role:** Proposal Investigator (Primary or additional)

**Applicant First Name:** Lei

**Applicant Last Name:** Li

**Co-Applciant Name(s):** --

**Applicant Email Address:** lli13@kennesaw.edu

**Applicant Phone Number:** 470-578-3915

**Primary Appointment Title:** Associate Professor

**Institution Name(s):** Kennesaw State University

**Submission Date:** Monday, December 12, 2016

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### Team Members (Name, Title, Department, Institutions if different, and email address for each):

Zhigang Li, Instructional Technology Specialist & Part-Time Assistant Professor of Information Technology, zli8@kennesaw.edu

Lei Li, Associate Professor of Information Technology, li\_lei@kennesaw.edu

Hossain Shahriar, Assistant Professor of Information Technology, hshahria@kennesaw.edu

Rebecca Rutherford, Interim Assistant Dean of the College of Computing and Software Engineering, Chair of the Department of Information technology, and Professor of Information Technology, brutherf@kennesaw.edu

Svetlana Peltsverger, Interim Associate Dean in the College of Computing and Software Engineering and Associate Professor of Information Technology, speltsve@kennesaw.edu

Dawn Tatum, Lecturer of Information Technology, dtatum7@kennesaw.edu

**Sponsor, (Name, Title, Department, Institution):**

Department of Information Technology

College of Computing and Software Engineering

Kennesaw State University

**Proposal Title:** 302

**Course Names, Course Numbers and Semesters Offered:**

IT 6843 - Ethical Hacking: Network Security and Penetration Testing – Offered twice a year in summer & fall semesters.

IT 6833 - Wireless Security– Offered once a year in spring semesters. It's also offer in summer semesters when needed.

IT 6883 - Infrastructure Defense – Offered once a year in fall semesters.

CSE 3801 - Professional Practices and Ethics– Offered three times a year in spring, summer & fall semesters with multiple sections each semester

**Average Number of** 34  
**Students per Course**  
**Section:**

**Number of Course** 25  
**Sections Affected by**  
**Implementation in**  
**Academic Year:**

**Total Number of Students** 855  
**Affected by Implementation**  
**in Academic Year:**

<b>List the original course materials for students (including title, whether optional or required, &amp; cost for each item):</b>	<p>1. IT4843, Hands-On Ethical Hacking and Network Defense, 2nd Edition, by Michael T. Simpson, Kent Backman, James Corley, ISBN-13: 978-1435486096, 2011. Required. Cost: \$202.30, enrollment:50, total cost: \$10,115.00</p> <p>2. IT6843,1) Hands-On Ethical Hacking and Network Defense, 2nd Edition, 2011, by Michael T. Simpson, Kent Backman, James Corley, ISBN-13: 978-1435486096.2) Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition, 2011, Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, Gideon Lenkey, Terron Williams, McGraw Hill, ISBN-13: 978-0071742559. Required. Cost: 1) \$202.30;2) \$34.90, Total: 237.20, enrollment: 75, total cost: \$17,790.00</p> <p>3. IT6833, Praphul Chandra, 2005, Bulletproof Wireless Security: GSM, UMTS, 802.11, and Ad Hoc Security, Publisher: ELSEVIER, ISBN: 0-7506-7746-5. Required. Cost: \$74.95, enrollment: 40, total cost: \$2,998.00</p> <p>4. IT6883, 1) Business Data Communications Infrastructure, Networking and Security (Edition 7th, 2012), William Stallings, Thomas Case, ISBN-10: 0-13-302389-3 ISBN-13: 978-0-13-302389-3; 2) Chained Exploits: Advanced Hacking Attacks From Start to Finish (Edition: 1st, 2009), Andrew Whitaker, Keatron Evans, Jack Voth, ISBN-13: 978-0321498816. Required. Cost: 1)\$161.70, 2). \$45.29, Total: \$206.99, enrollment: 40, total cost: \$8,279.60</p> <p>5. CSE3801, A Gift of Fire: Social, Legal, and Ethical Issues for Computing Technology, 4th Ed., 2012, by Sara Baase, ISBN-13: 978-0132492676, Required. Cost: \$115.70, enrollment: 680, total cost: \$78,676.00.</p>
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<b>Requested Amount of Funding:</b>	\$30,000
<b>Original per Student Cost:</b>	\$836.94
<b>Post-Proposal Projected Student Cost:</b>	\$0
<b>Projected Per Student Savings:</b>	\$836.94

**Projected Total Annual** \$117,843.60

**Student Savings:**

**Creation and Hosting Platforms Used ("n/a" if none):**

Kennesaw State University D2L Brightspace

**Proposal Category:** No-Cost-to-Students Learning Materials

**Final Semester of** Fall 2017

**Instruction:**

**Project Goals:**

In this project, we propose to take a department-wide effort to transform the five information security related courses using no-cost-to-students learning material. This project not only aims to reduce the financial burden imposed by high cost of textbooks, but also strives to develop free and open-access learning materials that offer equivalent or better educational effectiveness than traditional textbooks. We also plan to develop online offerings of proposed courses that meet the internationally recognized Quality Matters (QM) standards.

**Statement of Transformation:**

**1. The Transformation Description**

According to Priceonomics ( <http://priceonomics.com/which-major-has-the-most-expensive-textbooks/>) an average undergraduate student annually spends \$1,200 on textbooks. The price of textbooks is now leading students' course decisions (M. Parry, "Students Get Savvier About Textbook Buying," The Chronicle of Higher Education, 27-Jan-2013.). The cost of textbooks depends on the major, with computing textbooks being in the top most expensive, and, at the same time, having one of the smallest resale values (Priceonomics). This is more than true for textbooks in Cybersecurity. The content of Cybersecurity courses is constantly changing with various innovations, updates, and revisions needed to keep the information current. Textbook publishers cannot keep up with the fast-moving changes in Cybersecurity and the textbook price for Cybersecurity is very high.

Georgia was recently ranked 3rd in the nation for information security, home to more than 115 information security-related companies (Technology Association of Georgia). Furthermore, there is a significant shortage of trained cybersecurity professionals anticipated in Georgia (USG Cyber Education Committee, 2015). In 2014, Georgia had an estimated 8000 open positions in cybersecurity-related fields with additional shortfalls expected in future years (USG Board of Regents Meeting Minutes, 2015). USG does not produce enough graduates for Georgia's job market. One of the reasons is the cost of education including textbook costs.

The textbooks currently used in the five proposed security related IT courses are quite expensive. Some textbooks do not have the latest edition in the market available (e.g., IT 6833 textbook is from 2005) or, not frequently updated (IT 4843 is from 2011 with new edition just released at the end of 2016

[http://www.cengage.com/search/productOverview.do?N=16+4294922389&Ntk=P\\_EPI&Ntt=15299614671691324142564844329453982650&Ntx=mode%2Bmatchallpartial](http://www.cengage.com/search/productOverview.do?N=16+4294922389&Ntk=P_EPI&Ntt=15299614671691324142564844329453982650&Ntx=mode%2Bmatchallpartial)). The goal of our transformation is to replace the textbook used in the proposed courses with no-cost-to-students learning materials that offer equal or higher educational effectiveness and can be easily updated more frequently.

Four out of six team members were part of the round two of an "Affordable Learning Textbook Transformation Grant" in 2015 (round two, award #119). They designed and evaluated the effectiveness of no-cost-to-students learning materials for database courses in IT department, and saved students \$110,419. The assessment results showed that the developed free material offered equivalent or better learning experience than the textbooks did. The preliminary results of the grant were published in the Proceedings of Southern Association for Information Systems Conference (SAIS 2016), the final results were published in the Proceedings of the ACM Special Interests Group in IT Education (SIGITE 2016), "Transforming IT Education with No-Cost Learning Materials". They also hosted a panel discussion on no-cost learning material in IT education, at SIGITE in October 2016. The panel attracted a lot of attention among computing faculty. Many colleagues from different states were impressed with the USG initiative and with course material developed by the team. Building on our past success and lessons learned from the prior ALG grant, we will continue our transformation efforts by developing no-cost learning material for five security related courses.

## **2. The Stakeholders of the Transformation**

There are two primary sets of stakeholders for this proposal – the students taking the five security related IT classes (both in-class and online students), and the faculty developing and teaching those courses. The high cost of textbooks puts a large financial burden on students and may become a road block for students' ability to finish their education. Our team of investigators strives to make higher education more affordable to the students. The information security related learning materials are widely available on the World Wide Web today, and some of them have been created by our faculty members. Many of these resources are publicly accessible, free, or with an open license to use. These materials include open and free tutorials, books, videos, labs, software, and services. For example, the majority of the network protocol specifications are published as Request for Comments (RFC) by the Internet Engineering Task Force (IETF) and the Internet Society (ISOC), the principal technical development and standards-setting bodies for the Internet. Security protocols such as Wi-Fi Protected Access version 2 (WPA2) are part of the IEEE 802.X group of networking protocols and their specifications are freely available on the Internet. IT security courses include hands-on labs where software and tools get updated frequently and current set of textbooks are not at par with the rapid update. These textbooks (see table 2) contain links to tools or websites which may no longer be available or supported for students to access needed information. As soon as a new version of a tool or software package is released, the instructions in a textbook become obsolete. Therefore, we need to include the latest available tools to prepare hands-on labs.



Many of the textbooks become outdated as soon as they are published, while digital delivery of the learning materials makes it easier to keep the content up-to-date. Developing and assembling a set of learning materials for major security-related courses is a unique approach. It will allow us to better align the learning material not only with the outcomes of each course, but also with the outcomes of the Information Technology program.

Compared to traditional textbooks, the open source software and web resources have many benefits: 1) the Web resources are generally free to use; 2) they are constantly being updated and always reflect the latest trends and industrial development; and, 3) the materials from the Web are also more dynamic and interactive. The pitfalls of Web resources are that they are often disorganized and may contain inaccurate information. However, members of our team of investigators are not only subject matter experts in the information security field, but also proficient educators who on average have more than 10 years teaching experience. We will select, organize and integrate resources from the web and transform the information into instructionally sound learning materials for the proposed courses including content that the team members develop themselves. We strongly believe that the new learning materials will offer up-to-date, equivalent or better learning effectiveness compared to the original textbooks. Digital delivery also allows us to add interactive elements into the learning materials. The interactive content will not only engage the students, but also improve their learning experience. It will help to enhance the learning outcomes and learning satisfaction.

### **3. The Impact of the Transformation**

The impact of our transformation efforts will be profound. By our estimates, more than 850 students will benefit from the no-cost learning material each year. Moreover, it has the potential to benefit more students when the proposed Bachelor of Science in Cybersecurity (eMajor) is approved by the Board of Regents.. The goal of eMajor is to reduce the cost of education by using prior learning assessments, lower tuition and potentially no-cost learning materials (<https://emajor.usg.edu>). The proposed project is expected to save current students \$117,843.60 in textbook costs each year (more if the eMajor is approved). Because of the cost savings from not having to buy textbooks, students may be able to take a few more courses each year and graduate sooner. Having a series of security courses adopting no-cost-to-student material not only offers better and more consistent learning experience to students, but also makes our nationally renowned IT programs more affordable. As a result, our IT programs could recruit more students and produce more qualified IT professionals that Georgia needs. Our experience gained in this transformation project could be useful to other programs or departments who want to lower the cost of education to their students. In summary, we believe the proposed project will have a positive impact in students' retention, progression, and graduation at program, department and institution levels.

([http://achievingthedream.org/press\\_release/15982/achieving-the-dream-launches-major-national-initiative-to-help-38-community-colleges-in-13-states-develop-new-degree-programs-using-open-educational-resources](http://achievingthedream.org/press_release/15982/achieving-the-dream-launches-major-national-initiative-to-help-38-community-colleges-in-13-states-develop-new-degree-programs-using-open-educational-resources) ,

[http://affordablelearninggeorgia.org/documents/ALG\\_Flyer\\_Sept\\_2014.4.pdf](http://affordablelearninggeorgia.org/documents/ALG_Flyer_Sept_2014.4.pdf).

## **Transformation Action Plan:**

With a coordinated effort, our team of investigators plan the following activities to transform all information security related courses to completely use no-cost learning materials:

- \* Research and identify no cost reading materials for each of the learning modules in each course. The reading list includes both required readings and optional readings. All of these readings will be publicly accessible, free to use, or openly licensed.
- \* Research and identify no cost materials that can be shared across the courses.
- \* Develop study guides and lecture notes for students' use to review course content and key learning points.
- \* Adopt or develop content, assignments, exercises and lab materials that are no cost to students to replace the ones in the textbooks.
- \* Develop test banks to replace the ones in the textbooks.
- \* Adopt open source or no-cost-to-student lab ware for students to gain hands-on experience.
- \* Update the syllabus to include major resources and no cost materials.
- \* Re-develop the proposed courses in our learning management system, D2L Brightspace, following Quality Matters<sup>TM</sup> standards

The responsibilities of each investigator is described as follows.

Dr. Lei Li, IT 6833, Project lead; Subject matter expert, course developer and instructor of record of IT 6833.

Dr. Rebecca Rutherford, CSE 3801, subject matter expert, course developer and instructor of record for CSE 3801.

Dr. Svetlana Peltsverger, IT 6843, subject matter expert, course developer and instructor of record for IT 6843.

Dr. Hossain Shahriar, subject matter expert, course developer and instructor of record for IT 4843.

Prof. Dawn Tatum, IT 6883, subject matter expert, course developer and instructor of record for IT 6883.

Dr. Zhigang Li, Provide Instructional Design Support to all five proposed courses.

All course design with the no-cost materials will be provided through D2L Brightspace for our students and on the ALG website for the public access.

**Quantitative & Qualitative Measures:** The investigators plan to assess the effectiveness of our proposal in two ways - in the middle and at the end of the semester. Qualitatively, we will design a survey and gather inputs from the students after they use the no-cost learning material. Quantitatively, we will compare students' performance data gathered from sections using traditional textbooks and sections using no-cost learning material. The investigators will collect student performance data such as pass rates from the five proposed courses taught with a textbook by team members between fall 2015 and summer 2016. This data will be used as a baseline for comparison of student performance in courses with alternative no cost material. Our assessment plan can be summarized as follows.

1. Student performance measures. This data is from the overall class performance based on the grading of student works. Metrics include:
  - \* Class average, grades distribution, pass rate for each grading item.
  - \* Overall letter grades distribution, pass rate, withdraw rate, and fail rate.
  - \* Percentage of students meeting or exceeding learning outcomes
2. Specific survey on no-cost learning materials. A web-based survey will be developed for all proposed courses and be distributed at the end of the semester to collect student feedback. It consists of a mixture of quantitative and qualitative measures including:
  - \* Student perception and attitude toward no cost materials
  - \* Quantitative ratings of the no cost materials used in this course
  - \* Qualitative comments and suggestions
3. Student evaluation of the instructor. Formal student evaluation of the instructor can also provide information about teaching effectiveness using no cost materials. This evaluation is based on standardized forms for every course. For each of the measurement, the investigators are going to conduct two levels of analysis: 1) Comparing the achievement levels of the course learning

outcomes - generally, 75% is the aimed passing rate in undergraduate courses and 80% in graduate courses. 2) Comparing the achievement levels to those from past offerings where costly textbooks were used. The investigators will use the data from the sections taught in the past 2 years. In addition, Kennesaw State University requires all online courses to be reviewed and approved following an internal review process using Quality Matters (QM) standards. This review will ensure the no-cost learning materials used or developed for the cyber security courses are instructionally sound. The College of Computing and Software Engineering will also conduct subject matter expert reviews for all developed courses to ensure the quality of the learning materials.

## **Timeline:**

### **Spring 2017**

- \* Collect baseline statistics on each course (course developers – those faculty who are in charge of the course for this study)
- \* Course modules redesigned to use the no cost materials. These include all new content, readings, lecture notes, video clips, exercises, labs, and assignments. The changes are reflected in the learning module study guides. (completed by course developers)
- \* Course level assessment and informational materials redesign. This includes quizzes, tests, and syllabus. (course developers and instructional designer)
- \* Submit the developed courses for instructional design review through Quality Matters. (instructional designer and KSU Distance Learning Center office)
- \* Submit the developed courses for subject matter expert review. (department Chair)

### **Summer 2017**

- \* Develop a survey on effectiveness of the no cost materials (all course developers and instructional designer)
- \* Teach:
  - o IT 6833 - Wireless Security, Dr. Li
  - o IT 6883 - Infrastructure Defense, Prof. Tatum
- \* Survey two summer courses and give student course evaluation (course developers and instructional designer)

### **Fall 2017**

- \* Teach:
  - o IT 4843 - Ethical Hacking for Effective Defense, Dr. Shahriar
  - o IT 6843 - Ethical Hacking: Network Security and Penetration Testing, Dr. Peltsverger
  - o CSE 3801 - Professional Practices and Ethics, Dr. Rutherford
- \* Survey three fall courses and give student course evaluation (course developers and

instructional designer)

\* Complete final assessment data analysis and prepare a final report (all course developers and instructional designer)

### **Budget:**

The funding mainly compensates our team of investigator's work and activity beyond normal teaching load or other job responsibilities in order to successfully complete the project. For each proposed course, course developers approximately will spend at least 80 hours in developing the no-cost learning material and be the instructor of record, and, will spend 20 hours in course assessment. Instructional support will devote at a minimum 50 hours in assisting course developers. Thus, we request the budget of this project as follows.

Dr. Lei Li, Project lead; course developer and instructor of record of IT 6833, \$5,000

Dr. Rebecca Rutherford, course developer and instructor of record for CSE 3801, \$5,000

Dr. Svetlana Peltsverger, course developer and instructor of record for IT 6843, \$5,000

Dr. Hossain Shahriar, course developer and instructor of record for IT 4843, \$5,000

Prof. Dawn Tatum, subject matter expert, course developer and instructor of record for IT 6883, \$5,000

Dr. Zhigang Li, Provide Instructional Design Support to all five proposed courses, \$3,000

Travel: \$2,000, for project team members to attend the ALG kickoff and subsequent meetings to bring back information to the team members. Our project team is also planning to submit a paper to reputable IT education conferences such as ACM SIGITE 2017 (Special Interest Group in IT Education).

Total Budget: \$30,000

Only open source software or free software will be used in this project thus there is no additional spending on software or equipment purchasing.

### **Sustainability Plan:**

The IT department implemented a course developer system for all courses. A course developer updates course content based on research, publications and feedback from students and alumni. Each of investigators except the instructional designer is a course developer for corresponding course. A course developer creates and maintains the course materials and teaching plans. He/she also teaches the course at least once a year to make sure all resources are valid and makes necessary changes and updates. This makes sure all no-cost materials and resources are highly sustainable in the future offerings of this course.



August 30, 2016

ALG Grant Committee  
University System of GA

Dear Colleagues:

This letter is in support of the Proposal "Transformation at scale: Developing No-Cost-to-Student Information Technology Security Related Courses" submitted from Kennesaw State University, Information Technology department faculty. As Department Chair for Information Technology, I clearly see the need for bringing down costs for our students. The ALG grants assist faculty to prepare no-cost courses that allow students to take courses without the monetary burden of expensive textbooks.

Several faculty in the Information Technology Department at Kennesaw State University have successfully carried out one ALG grant for database courses in the curriculum. The current proposal addresses security related courses in the IT curriculum. The savings already realized from the previous ALG grant encouraged our faculty to develop this new ALG grant proposal to help our students save even more money.

I strongly support this proposal. This is a very sustainable proposal as we have a large Information Technology degree program. Many of our students take courses online as well as in-class. Creating the no-cost for textbook version of our security courses will allow students for many years to realize savings from not buying textbooks for both database and security courses.

This is a very solid proposal. All faculty participating in the first ALG grant completed their courses and offered them successfully. Papers for two conferences about the grant have been created and presented (one this end of September). I believe that this new ALG proposal will have the same student satisfaction and success that the first ALG grant did. This new proposal will have an even larger monetary impact on our students than the first grant. Thank you for your consideration for this proposal.

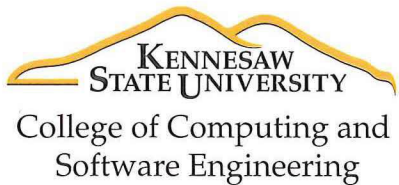
Sincerely,



Rebecca H. Rutherford, Ed.D.

Interim Assistant Dean of the College of Computing & Software Engineering, Department

Chair for Information Technology, Professor of Information Technology  
[brutherf@kennesaw.edu](mailto:brutherf@kennesaw.edu)



December 8, 2016

Dear Affordable Learning Georgia (ALG) Grant Reviewers,

It is my pleasure to write this letter in support of the proposal, "Transformation at scale: Developing No-Cost-to-Student Information Technology Security Related Courses", submitted by Dr. Li, Dr. Shahriar, Dr. Rutherford, Dr. Peltsverger, Dr. Li, and Ms. Tatum from our Information Technology (IT) Department at Kennesaw State University.

In this project, the primary investigators will work as a team to replace existing, costly textbooks in five information security related courses with no-cost-to-students learning materials. Their efforts will significantly lower the cost of education for students (saving over \$100k per year at KSU alone) and generate a positive impact on the retention, progression, and graduation for the College of Computing and Software Engineering. Additionally, given the rapid change of the IT field, having digital materials available to students will improve the ability to keep them updated with the latest advances in the field of information security.

Four of the proposers have past experience with a successful ALG project, thus the quality and success of this new project is highly likely. The investigators in this project are also designated course architects who are responsible for the development and the maintenance of the to-be-transformed courses. The no-cost-to-students materials developed will be distributed using the course management system, GeorgiaView Desire2Learn. Thus, I believe the effort of this project will be sustainable over the long term and benefit students throughout Georgia.

In conclusion, I wholeheartedly support this effort. This proposal has the full support of the College of Computing and Software Engineering.

Sincerely,

Dr. Jon A. Preston  
Interim Dean  
College of Computing and Software Engineering  
Kennesaw State University



**From:** [Tamara Powell](#)  
**To:** [Rachel Myers](#); [Seneca Vaught](#); [Griselda Thomas](#); [John L. Isenhour](#); [John L. Isenhour](#); [Ophelia Santos](#); [Charles Marvil](#); [Shangrong Deng](#); [Laura Ritter](#); [Guangzhi Zheng](#); [Zhigang Li](#); [Lei Li](#); [Rebecca Rutherford](#); [Svetlana Peltsverger](#); [Zhigang Li](#); [Nancy Colyar](#); [Ginny Zhan](#); [May H. Gao](#); [Yumin Ao](#); [Carlton Usher](#); [Linda Lyons](#); [Daniel Farr](#); [Tiffani Reardon](#); [Jonathan Arnett](#); [Monique Logan](#); [Cassandra Race](#); [Sharon Pearcey](#); [Chris K. Randall](#); [Jennifer Willard](#); [Beth Kirsner](#); [Adrienne Williamson](#); [Tricia Mahaffey](#); [Chi Zhang](#)  
**Cc:** [Rita Spisak](#); [Elke Leeds](#)  
**Subject:** Hello Textbook Transformation Grant Winners! We Would Like to Honor You!  
**Date:** Wednesday, March 2, 2016 1:04:24 PM  
**Attachments:** [KSU Library System Authors Request for Items.docx](#)

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Hello Textbook Transformation Grant Winners!

You are receiving this email because you have dedicated your time and expertise to reducing the student debt load at KSU. Please see your names and accomplishments listed below. In total, you have reduced at least \$1,048,545 from the KSU student debt load each year. Please see the attached and submit your information for the SPSU L. V. Johnson Library Annual Authors Reception. And please let me know if there are any corrections or changes to the information below, as I would like to write up an article celebrating this incredible achievement. Thank you for all your hard work. Tammy

Camille Payne and Rachel Myers (Nursing) student savings, \$30,468  
Seneca Vaught and Griselda Thomas (AADS) \$20,840  
John Isenhour, Ophelia Santos, Charles Marvil (Culinary Studies) \$13,875  
Lake Ritter, Shangrong Deng (Math) \$157,865  
Guangzhi Zheng and Zhigang Li (Information Technology) \$16,833  
Lu Kang and Zhigang Li (Chemistry) \$184,320  
Lei Li, Rebecca Rutherford, Svetlana Peltsverger, Jack Zheng, Zhigang Li, Nancy Colyar (Computer Science/IT) \$110,419  
Ginny Zhan, May Gao, Yumin Ao (Asian Studies) \$11,249  
Carlton Usher and Linda Lyons (First Year Studies) \$67,250  
Daniel Farr and Tiffani Reardon (Sociology) \$13,963.80  
Tamara Powell, Jonathan Arnett, Monique Logan, Cassandra Race, Tiffani Reardon (DWMA/English) \$51,615  
Sharon Pearcey, Chris Randall, Jen Willard, Beth Kirsner, Adrienne Williamson, Tricia Mahaffey (Psychology) \$345,912  
Chi Zhang and Bob Brown (Information Technology) \$23,936

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"My job is not to prop the door of opportunity open. It is to take that door off its hinges once and for all."  
Former Massachusetts Lt. Gov. Evelyn Murphy

Dr. Tamara Powell  
Director of Distance Education, College of Humanities and Social Sciences  
Associate Professor of English  
Kennesaw State University  
CHSS Dean's Suite, 42 Bartow Avenue NW  
MD 2201 Bldg. 22 Rm 5008  
Kennesaw, GA 30144-5591  
470-578-2911

# Syllabus

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Module	Topic	Resource
1	Ethical Hacking Overview	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module1.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module1.zip</a>
2	TCP/IP level attacks	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module2.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module2.zip</a>
3	Port scanning	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module3.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module3.zip</a>
4	TCP/IP and DDoS	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module4.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module4.zip</a>
5	Footprinting and Social Engineering	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module5.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module5.zip</a>
6	Enumeration	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module6.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module6.zip</a>
7	Programming for Security Professionals	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module7.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module7.zip</a>
8	Operating System Vulnerabilities	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module8.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module8.zip</a>
9	Embedded System security	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module9.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module9.zip</a>
10	Hacking Web Servers	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module10.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module10.zip</a>
11	Hacking Wireless Networks	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module11.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module11.zip</a>
12	Cryptography	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module12.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module12.zip</a>
13	Protecting Networks with Security Devices	<a href="http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module13.zip">http://ksuweb.kennesaw.edu/~hshahria/ALG-R8/IT4843/module13.zip</a>

# Final Report

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# Affordable Learning Georgia Textbook Transformation Grants

## Final Report

### *Instructions:*

A. *Your final report submission must include four separate component files:*

1. *Completed report form. Please complete per inline instructions. The italicized text is provided for your assistance; please delete the italicized text before submitting your report.*
2. *Course Outline document with links to the materials as used per day, week, or unit, organized chronologically. [View Course Outline Example](#)*
  - a. *For each resource, give the title, author, Creative Commons licenses (if appropriate), and freely accessible URL to the material. Include all open-access links to all adopted, adapted, and newly created course materials.*
3. *Supporting data on the impact of your Textbook Transformation (survey, analyzed data collected, etc.)*
4. *A photograph of your team and/or your students for use in ALG website and materials.*
  - a. *Photograph must be 800x600 pixels at minimum (length x height).*
  - b. *Photograph must be taken together: individual team member photographs and website headshots not accepted.*

B. Go to [http://affordablelearninggeorgia.org/site/final\\_report\\_submission](http://affordablelearninggeorgia.org/site/final_report_submission) to submit these four components of your final report. Follow the instructions on the webpage for uploading your documents. You will receive a confirmation email. Based on receipt of this report, ALG will process the final payment for your grant. ALG may follow up with additional questions or to request your participation in a publication, presentation, or other event.

**Date: 12/12/2017**

**Grant Number: 302**

**Institution Name(s): Kennesaw State University**

**Team Members (Name, Title, Department, Institutions if different, and email address for each):**

- Lei Li, Professor of Information Technology, Department of Information Technology, [li\\_lei@kennesaw.edu](mailto:li_lei@kennesaw.edu)
- Zhigang Li, Instructional Technology Specialist & Part-Time Assistant Professor of Information Technology, Distance Learning Center, [zli8@kennesaw.edu](mailto:zli8@kennesaw.edu)
- Hossain Shahriar, Assistant Professor of Information Technology, Department of Information Technology, [hshahria@kennesaw.edu](mailto:hshahria@kennesaw.edu)

- Rebecca Rutherford, Interim Assistant Dean of the College of Computing and Software Engineering, Chair of the Department of Information technology, and Professor of Information Technology, Department of Information Technology, [brutherf@kennesaw.edu](mailto:brutherf@kennesaw.edu)
- Svetlana Peltsverger, Interim Associate Dean in the College of Computing and Software Engineering and Professor of Information Technology, Department of Information Technology, [speltsve@kennesaw.edu](mailto:speltsve@kennesaw.edu)
- Dawn Tatum, Lecturer of Information Technology, Department of Information Technology, [dtatum7@kennesaw.edu](mailto:dtatum7@kennesaw.edu)

**Project Lead: Dr. Lei Li**

**Course Name(s) and Course Numbers:**

- IT 4843 - Ethical Hacking for Effective Defense – Offered twice a year in summer & fall semesters.
- IT 6843 - Ethical Hacking: Network Security and Penetration Testing – Offered twice a year in summer & fall semesters.
- IT 6833 - Wireless Security– Offered once a year in spring semester.
- IT 6883 - Infrastructure Defense – Offered once a year in fall semester.
- CSE 3801 - Professional Practices and Ethics– Offered three times a year in spring, summer & fall semesters with multiple sections each semester.

**Semester Project Began: Spring 2017**

**Semester(s) of Implementation: Fall 2017**

**Average Number of Students Per Course Section:**

**Number of Course Sections Affected by Implementation:**

**Total Number of Students Affected by Implementation:**

Course	Number of sections	Students in each section	Total Students Affected
IT4843	2	32, 26	58
IT6843	2	7, 17	24
IT6833	2	13, 30	43
IT6883	2	6,20	26
CSE3801	5	48,46,36,35, 63	228
Total	9		379

## 1. Narrative

A. Describe the key outcomes, whether positive, negative, or interesting, of your project.

Our transformation effort is very successful. In this project, we have transformed five courses using no-cost-to-student learning material. Nine sections and total number of 379

students have been impacted. Students' opinions on Learning material we created are overwhelmingly positive. Our assessment data shows that, in majority of the section where the no-cost learning material were implemented, students' performance is either neutral or better comparing to students' performance in previously taught sections using textbooks.

From the instructors' perspectives, collecting and organizing the learning material ourselves not only enable us to better respond to dynamic nature of the information technology field, but also give us the flexibility to customize the course content to better serve our students. On the other side of the coin, the transformation activities require significant efforts and time commitment from the faculty to collect, organize, create, and maintain no-cost learning material that offers equivalent learning experience as the textbooks. Our transformative efforts in replacing textbooks in the proposed courses will not happen without the strong supports from ALG grant.

With our sustainability plan, the no-cost learning material will be continually used and hundreds and thousands of students from Kennesaw State University will enjoy the cost savings and enhanced learning experience in the future.

B. Describe lessons learned, including any things you would do differently next time.

Below are the lessons learned from the members of our project team.

*Dr. Hossain Shahriar on IT 4843.* The software tools keep changing fast, for example, Wireshark got its latest version recently. Lesson learned is to keep checking on tools for update and revise instructions and screenshots accordingly.

*Dr. Svetlana Peltsverger on IT 6843.* Some sources I used in class were not available when modules were covered. Most of them were YouTube videos that demonstrated latest attacks. The videos were removed by YouTube. The lesson learned is to use only reputable YouTube channels.

*Dr. Becky Rutherford on CSE3801.* This is the type of course that lends itself well for no textbook. The contents will need to be updated to be sure current issues and ethical links are included for the course.

## 2. Quotes

Provide three quotes from students evaluating their experience with the no-cost learning materials.

1. *"The presented readings combined with the learning modules was almost always enough for me to gain a solid grasp of the current topic. Whenever more materials were required, the information in the module was at least enough to help me seek out the additional free materials I needed for myself."* -IT6843
2. *"Since we are Information Technology majors, and our assignments are all about technology, textbooks are largely useless. Even in classes that do require textbooks, I never buy them"*

*because there are so many resources online. It's nice to have sources listed within the course to use in conjunction with what I find on my own.* " - IT4843

3. *"I thought this method was far more organized and more readable than an ordinary textbook."* - CSE3801

### **3. Quantitative and Qualitative Measures**

#### **3a. Overall Measurements**

##### **Student Opinion of Materials**

**Was the overall student opinion about the materials used in the course positive, neutral, or negative?**

The overall student opinion about the materials used in the courses is overwhelmingly positive.

Total number of students affected in this project: \_\_\_\_379\_\_\_\_

- Positive: \_\_\_\_87.91\_\_\_\_ % of \_\_\_\_91\_\_\_\_ number of respondents
- Neutral: \_\_\_\_5.49\_\_\_\_ % of \_\_\_\_91\_\_\_\_ number of respondents
- Negative: \_\_\_\_6.60\_\_\_\_ % of \_\_\_\_91\_\_\_\_ number of respondents



## Student Learning Outcomes and Grades

**Was the overall comparative impact on student performance in terms of learning outcomes and grades in the semester(s) of implementation over previous semesters positive, neutral, or negative?**

We have 5 courses in this project. In term of learning outcomes and grades comparing to previous semesters, three courses are neutral, one course is positive and one course is negative. Overall student performance outcome is neutral comparing to previous semester.

*Student outcomes should be described in detail in Section 3b.*

Course	Student Performance outcome comparing to previous semester
IT4843	Neutral
IT6843	Negative
IT6833	Neutral
IT6883	Neutral
CSE3801	Positive

Choose One:

- ☐ Positive: Higher performance outcomes measured over previous semester(s)
- ☒ Neutral: Same performance outcomes over previous semester(s)
- ☐ Negative: Lower performance outcomes over previous semester(s)

## Student Drop/Fail/Withdraw (DFW) Rates

**Was the overall comparative impact on Drop/Fail/Withdraw (DFW) rates in the semester(s) of implementation over previous semesters positive, neutral, or negative?**

We have 5 courses in this project. The DFW rates of IT 4843 and CSE 3801 are reduced. The DFW rates of IT 6843 and IT 6833 are slightly increased. Overall, the DFW rates for our project is neutral.

	Drop/Fail/Withdraw Rate:	
Course	Previous semester	Implementation semester
IT4843	2/23=8.6%	1/26= 3.8%
IT6843	4/35=11%	4/24=17%
IT6833	1/31= 3%	2/43 =4.6%
IT6883*		
CSE3801	6/41=15%	6/48=13%

Note: 1) the passing grade for student is B (80%); 2) the DFW rate for IT 6883 isn't available.

**Drop/Fail/Withdraw Rate:**

\_\_\_9.22\_\_\_% of students, out of a total \_\_\_141\_\_\_ students affected, dropped/failed/withdrew from the course in the final semester of implementation.

Choose One:

- \_\_\_ Positive: This is a lower percentage of students with D/F/W than previous semester(s)
- X Neutral: This is the same percentage of students with D/F/W than previous semester(s)
- \_\_\_ Negative: This is a higher percentage of students with D/F/W than previous semester(s)

### **3b. Narrative**

- *In this section, summarize the supporting impact data that you are submitting, including all quantitative and qualitative measures of impact on student success and experience. Include all measures as described in your proposal, along with any measures developed after the proposal submission.*

In project, we proposed to use multiple channels of data to measure the success of our transformative efforts.

Quantitatively, we compared students' DFW rates, grades, and success in learning objectives. The DFW rates are taken from student registration system. The student grades and success in learning objectives are assessed Faculty Course Assessment Report (FCAR). Faculty in IT department at Kennesaw State University are required to create a FCAR for every course they teach for each semester. The FCAR includes students' grade and success in achieving the learning outcomes.

Qualitatively, we developed a survey to collect students' opinion on the learning material used in the courses. Students rated their experience using a 5 points scale. Students also give the opportunities to enter comments they may have. A copy of survey result is attached separately.

Based on the assessment data we collected, the learning material we created offer the same level of the learning effectiveness as the textbook. Students' performance outcomes and DFW in generally stay the same pre-implementation and post-implementation.

### **4. Sustainability Plan**

The IT department at KSU implemented a course architect system for all courses. A course architect updates course content based on research, publications and feedback from students and alumni. Each of instructor of record is a course architecture for corresponding courses. A course architect develops and maintains the course materials and teaching plans. He/she also teaches the course at least once a year to make sure all resources are valid and make necessary changes. This makes sure all no-cost materials and resources are highly sustainable in the future offerings of this course.

## 5. Future Plans

- *Describe any impacts or influences this project has had on your thinking about or selection of learning materials in this and other courses that you will teach in the future.*
- *Describe any planned or actual papers, presentations, publications, or other professional activities that you expect to produce that reflect your work on this project.*

Information technology is dynamic field where existing technology frequently get updated and new technology constantly comes out. Due to this reason, the no-cost learning material model naturally fits better for IT curriculum than the traditional textbook models. The faculty in the IT department already completed several individual ALG project and two transform-at-scale grants. The positive feedback from the students and our own development and implementation process inspire more faculty in the IT to get involved with developing no cost learning material for their courses.

We shared our experience from this project in the 14<sup>th</sup> Annual Open Education Conference in Anaheim CA. Two of our team members, Dr. Rutherford and Prof. Tatum hosted a panel discussion on open source learning material in this conference in October 2017. The responses we received from the panel discussion are very positive.

## 6. Description of Photograph



*Left to right: Dr. Rutherford, instructor of record; Dr. Li, team lead and instructor of record; and Dr. Peltzverger, instructor of record.*